William R. Holmes

Vanderbilt University
Department of Physics and Astronomy
6410 Stevenson Science Center
Nashville, TN 37212

Phone: 615-322-2599
Email: william.holmes@vanderbilt.edu
Homepage: http://holmeslab.home.blog/
Google Scholar: Click Link

Employment History

- Vanderbilt University,
  - Assistant Professor - Department of Physics and Astronomy (2015 - Present)
  - Associate Director - Quantitative Systems Biology Center (2017 - Present)
  - Assistant Professor (Courtesy) - Department of Mathematics (2017 - Present)
- University of Melbourne, Continuing Lecturer (TT Asst. Prof. equivalent), Department of Mathematics and Statistics, 2014 - 2015
- University of California Irvine, Assistant Researcher, Department of Mathematics and the Centre for Complex Biological Systems, 2012 - 2014
- University of British Columbia (UBC), Postdoctoral Fellow in Mathematics, 2010-2012
- Rolls Royce Aerospace (3 Co-Op Semesters), Experimental Test Engineer , 2002- 2003

Education

- Ph.D. Mathematics, Indiana University Bloomington, 2010.
  - Thesis: A 3-D Non-Local Model of the Mammalian Cochlea with Numerical Simulation (with Jacob Rubinstein and Michael Jolly)
- M.A. Mathematics, Indiana University Bloomington (IUB), 2007.
- B.S. Engineering Physics, University of Tennessee (UTK), 2005.

Grants

- 2021-2025 - NIH 2R01 DK106228 (MPI) - Microtubule Regulation of Pancreatic Beta Cell Function and Diabetes - Total = $3,082,476 (to WRH: $1,318,184)
- 2021-2025 - NIH #R01GM052932 (Sub-contract from U. of Wisconsin) - Dynamic Pattern Formation in the Cell Cortex - Total Amount to WRH: $154,841
- 2016-2021 - NSF #DMS1562078 (PI) - Early Mammalian Embryo Development: Stochastic Modeling and Experiments - Total Amount: $418,563
- 2015-2019 (no-cost-extension) - NSF #SES1556325 (co-PI) - The Impact of Dynamically Changing Information on Decision Processes - Total Amount: $340,456
  - 2015-2018 - Supplement: Research Experience for Undergraduates. Direct Costs: $6,000. Role: Co-PI.
  - 2016-2018 - Supplement: Research Experience for Undergraduates. Direct Costs: $19,076. Role: Co-PI.
- 2018 - American Society of Clinical Pathology (N/A) - This is not a direct grant. Rather the society (in agreement with their CEO) provided space and financial support to facilitate experimental data collection to study physicians decisions at their annual conference.

- 2018-2019 - Internal VUMC Department of Pathology grant (co-PI) - A Mobile VUMC Pathology Lab to Investigate Diagnostic Decision-making Errors. Direct Costs: $4,000
- 2017-2018 - Internal VUMC Department of Pathology grant (co-PI) - Investigation of Cognitive Factors involved in Diagnostic Decision-Making in Pathology. Direct Costs: $4,000
- 2016-2017 - Vanderbilt International Research Grant (PI) - Computational Modeling of Cell-Environment Interactions. Direct Costs: $8,240.
- 2016-2017 - Vanderbilt International Research Grant (co-PI) - Computational Models of Dynamic Decision-making. Direct Costs: $20,000.
- 2009 - NSF #0913159 (PI) - The effect of spatial heterogeneity on the secretion properties of parotid acinar cells (Graduate student research grant with attached funds from NZ Ministry of Science.)

Publications

* Indicates equal contributing or co-corresponding authors.

48. Kathryn P. Trogden, Hudson McKinney, Xiaodong Zhu, Goker Arpag, Thomas G. Folland, Anna B. Osipovich, Mark A Magnuson, Marija Zanic, Guoqiang Gu, William R. Holmes, Irina Kaverina, (2021) "Microtubules regulate pancreatic beta cell heterogeneity via spatiotemporal control of insulin secretion hot spots", Accepted at ELife

47. Q. Yu, W. R. Holmes, J. P. Thiery, R. B. Luwor, V. Rajagopal, (2021) "Cortical Tension Initiates the Positive Feedback Loop Between E-cadherin and F-actin, Accepted at Biophysical Journal, BioRxiv 2021.02.23.432578

46. Alison Moe, William Holmes*, Adriana E. Golding, Jessica Zola, Zachary T Swider, Leah Edelstein-Keshet, and William Bement*, (2021) "Cross talk-dependent cortical patterning of Rho GTPases during cell repair ", Molecular Biology of the Cell, 32(16),

45. Z. Cang, Y. Wang, Q. Wang, K.W.Y Cho, W. R. Holmes, Q. Nie, (2021) "A multiscale model via single-cell transcriptomics reveals robust patterning mechanisms during early mammalian embryo development", PLoS Computational Biology, 17(3), e1008571

44. J. S. Trueblood*, Q. Eichbaum, A. C. Seegmiller, C. Stratton, P. O' Daniels W. R. Holmes*, (2021) "Disentangling prevalence induced biases in medical image decision-making", Cognition, 212, p 104713

43. J. S. Trueblood*, A. Heathcote, N. Evans, W. R. Holmes*, (2021) "Urgency, Leakage, and the Relative Nature of Information Processing in Decision Making", Psychological Review, 128(1), p. 160-186

42. N. J. Evans, W. R. Holmes*, Aneesha Dasari, J. S. Trueblood*, (2021), "The Impact of Presentation Order on Attraction and Repulsion Effects in Decision-making", Decision 8(1), p. 36-54.

41. C. Zmurchok, W. R. Holmes, (2020) "Simple Rho GTPase Dynamics Generate a Complex Regulatory Landscape Associated with Cell Shape", Biophysical Journal 118(6), p. 1438-1454

40. C. Zmurchok, Jared Collette, Vijay Rajagopal, W. R. Holmes, (2020) "Membrane tension can enhance adaptation to maintain polarity of migrating cells", Biophysical Journal 119(8), p. 1617-1629

39. J. J. Vastola, W. R. Holmes, (2020) "The chemical Langevin equation: a path integral view of Gillespie's derivation", Phys. Rev. E. 110(3), p. 032417

38. P. O'Daniels, J. Trueblood, W. R. Holmes, (2020) "A joint deep neural network and evidence accumulation modeling approach to human decision-making with naturalistic images", Computational Brain and Behavior 3(1), p. 1-12

37. K. M. Bracey, K. H. Ho, D. Yampolsky, G. Gu, I. Kaverina*, W. R. Holmes*, (2020) "Microtubules Regulate Localization and Availability of Insulin Granules in Pancreatic Beta Cells", Biophysical Journal 118(1), p 193-206

36. N.J. Evans, J.S. Trueblood, W.R. Holmes, (2020) “A parameter recovery assessment of time-variant models of decision-making.”, Behavior research methods 52(1), p. 193-206

35. W. R. Holmes, (2019) “Sub-diffusive dynamics lead to depleted particle densities near cellular borders", Biophysical Journal 116 (8), p. 1538-1546

34. Z. Kilpatrick, W. R. Holmes, T. L. Eissa, K. Josic, (2019) “Optimal decision making in dynamic environments”, Current opinion in neurobiology 58, p. 54-60

33. N. J. Evans, W. R. Holmes*, J. S. Trueblood*, (2019) “Response time data provides critical constraints on dynamic models of multi-alternative, multi-attribute choice", Psychonomic Bulletin and Review 26 (3), p. 901-933

32. W. R. Holmes 1 of 27 co-authors, (2019) “The Quality of Response Time Data Inference: A Blinded, Collaborative Approach to the Validity of Cognitive Models", Psychological Bulletin and Review 26(4), pp. 1051-1069

31. Y. Lin, A. Heathcote, W. R. Holmes (2019) “Parallel Probability Density Approximation", Behavioral Research Methods 51(6), p. 2777-2799.

30. Vijay Rajagopal*, W. R. Holmes*, Peter Vee Sin Lee, (2018) “Computational Modelling of Single Cell and Cytoskeletal Mechanobiology", WIREs Systems Biology and Medicine 10(2), e1407

29. W.R. Holmes*, L. Edelstein-Keshet*, (2018), “Editorial Overview: Mathematical Modeling Issue", Current Opinion in Systems Biology (9), p. iv-viii

28. J. S. Trueblood*, W. R. Holmes*, 8 others (including one VU Undergraduate), (2018). “The impact of speed and bias on the cognitive processes of experts and novices in medical image decision-making”. Cognitive Research: Principles and Implications, 3(1), p.28.

27. W. R. Holmes, Jennifer S. Trueblood, (2018) "Bayesian analysis of the piecewise diffusion decision model", Behavioral Research Methods 50(2), pp. 730-743

26. Anna A.W.M. Sanders, Kevin Chang, Xiaodong Zhu, Roslin J. Thoppil, W. R. Holmes*, Irina Kaverina* (2017) “Non-random γ-TuNA-dependent spatial pattern of microtubule nucleation at the Golgi", Molecular Biology of the Cell 28(23), 3181-3192

25. W. R. Holmes, JinSeok Park, Andre Levchenko, Leah Edelstein-Keshet, (2017) "A mathematical model coupling polarity signaling to cell adhesion explains diverse cell migration patterns", PLoS Computational Biology 13 (5), e1005524

24. JinSeok Park, W. R. Holmes, Sung-Hoon Lee, Hong-Nam Kim, Deok-Ho Kim, Moon Kyu Kwak, Chiaochun Joanne Wang, Kahp-Yang Suh, Leah Edelstein-Keshet, Andre Levchenko, (2017) "A mechano-chemical feedback underlies co-existence of qualitatively distinct cell polarity patterns within diverse cell populations", PNAS, 201700054

23. W. R. Holmes*, Nabora Soledad Reyes de Mochel*, Qixuan Wang, Huijing Du, Michael Chiang, Olivier Cinquin, Ken W.Y. Cho, Qing Nie, (2017) “Gene Expression Noise Enhances Robust Organization of the Early Mammalian Blastocyst.” , PLoS Computational Biology 13 (1), e1005320

22. Qixuan Wang*, W. R. Holmes*, Julian Sosnik, Thomas Shilling, Qing Nie, (2017) “Cell sorting and noise induced cell plasticity coordinate to sharpen boundaries between gene expression domains”, PLoS Computational Biology 13 (1), e1005307

21. W. R. Holmes, Leah Edelstein-Keshet, (2016) “Analysis of a minimal Rho-GTPase circuit regulating cell shape”, Physical Biology (13), 046001

20. W. R. Holmes*, Jennifer Trueblood*, Andrew Heathcote, (2016) “A new framework for modeling decisions about changing information: The Piecewise Linear Ballistic Accumulator model", Cognitive Psychology (85), 1-29

19. W. R. Holmes, Adriana E. Golding, William M. Bement, Leah Edelstein-Keshet, (2016) “A mathematical model of GTPase pattern formation during single-cell wound repair”, Journal of the Royal Socity Interface Focus 6(5), 20160032

18. Darragh Walsh, Philipp Roth. W. R. Holmes, Kerry Landman, Tobias Merson, Barry Hughes, (2016) "Is cell migration or proliferation dominant in the formation of linear arrays of oligodendrocytes?", Journal of Theoretical Biology (406), 17-30

17. W. R. Holmes, (2015) "A practical guide to the Probability Density Approximation (PDA) with improved implementation and error characterization" Journal of Mathematical Psychology, 68, 13-24

16. W. R. Holmes*, Laura Liao*, William Bement, Leah Edelstein-Keshet, (2015) "Modeling the roles of protein kinase C beta and eta in single cell wound repair". Molecular Biology of the Cell, 26(22): 4100-4108

15. Huijing Du, Qing Nie, W. R. Holmes, (2015) "The interplay between Wnt mediated expansion and negative regulation of growth promote robust intestinal crypt structure and homeostasis.", PLoS Computational Biology, 11(8): e1004285

14. W. R. Holmes, May Anne Mata, Leah Edelstein-Keshet, (2015) "Local Perturbation Analysis: A computational tool for biophysical reaction-diffusion models." Biophysical journal 108.2, 230-236

13. Alexander Gord*, W. R. Holmes*, Xing Dai, Qing Nie, (2014) "Computational modeling of epidermal stratification highlights the importance of asymmetric cell division for predictable and robust layer formation". Journal of the Royal Society Interface, 11(99), pp. 20140613

12. W. R. Holmes, Qing Nie, (2014) "Interactions and tradeoffs between cell recruitment, proliferation, and differentiation affect CNS regeneration", Biophysical Journal, 106(7), pp. 1528-1536

11. W. R. Holmes, (2014) "An excitable compass guides chemotaxis?", Biophysical Journal, 106(5), pp. 989

10. W. R. Holmes, (2014) "An efficient, non-linear stability analysis for detecting pattern formation in reaction diffusion systems", Bulletin of Mathematical Biology, 76(1), pp. 157-283

9. L. Edelstein-Keshet, W. R. Holmes, Mark Zajac, Meghan Dutot, (2013) "From simple to detailed models for cell polarization", Philosophical Transactions of the Royal Society B, 338, pp. 20130003

8. M. Meta, M. Dudot, L. Edelstein-Keshet, W. R. Holmes, (2013) "A model for intracellular actin waves explored by nonlinear local perturbation analysis", Journal of Theoretical Biology, 334, pp. 149-161

7. B. Lin, W. R. Holmes, J. Wang, T. Ueno, A. Harwell, L. Edelstein-Keshet, T. Inoue, and A. Levchenko, (2012) "Synthetic graded Rac activation drives cell polarity and locomotion", PNAS, 109(52), E3668-E3677

6. W. R. Holmes, L. Edelstein-Keshet, (2012) "A Comparison of Computational Models for Eukaryotic Cell Shape and Motility", PLoS Computational Biology, 8(12), e1002793

5. W. R. Holmes, A. Carlsson, and L. Edelstein-Keshet, (2012) "Regimes of Wave Type Patterning driven by Refractory Actin Feedback: Transition from Static Polarization to Dynamic Wave Behaviour", Physical Biology, 9(4), 046005

4. W. R. Holmes, B. Lin, A. Levchenko, and L. Edelstein-Keshet, (2012) "Modelling cell polarization driven by synthetic spatially graded Rac activation", PloS Computational Biology, 8(6), e1002366

3. W. R. Holmes, M.S. Jolly, and J. Rubinstein, (2011) "Hydro-elastic waves in a cochlear model: Numerical simulations and an analytically reduced model", Confluentes Mathematici, Vol. 3, No. 3 pp. 523-541

2. A 3-D model of the Cochlea with Numerical Simulation and Asymptotics, PhD Thesis, Indiana University (2010)

1. T.A. Perkins*, W. R. Holmes*, J. F. Weltzin, (2007) "Multi-species interactions in competitive hierarchies: new methods and empirical test". Journal of Vegetation Science: Vol. 18, No. 5 pp. 685-692

Submitted but not published articles

4. S. Groves et al. (WRH one of 23 authors), (2021) “Archetype tasks link intratumoral heterogeneity to plasticity in recalcitrant small cell lung cancer", Submitted to Molecular Systems Biology
3. C. Zmurchok, W. R. Holmes, (2021) “Biophysical Models of PAR Cluster Transport by Cortical Flow in C. elegans Early Embryogenesis”, In Revision at Bulletin of Mathematical Biology bioRxiv, 2021.06.28.450200
2. J. J. Vastola, G. Gorin, L. Pachter, W. R. Holmes, (2021) "Analytic solution of chemical master equations involving gene switching I: Representation theory and diagrammatic approach to exact solutions, In Revision at Phys. Rev. E., ArXiv:2103.10992
1. J. J. Vastola, W. R. Holmes, (2020) ”Stochastic path integrals can be derived like quantum mechanical path integrals", Submitted to Phys Rev. E., ArXiv:1909.12990

Invited Talks

1. Internal Seminars - Physics Colloquium, Quantitative Systems Biology Center seminar (2x), Center for Quantitative Systems seminar, Mathematics department seminar, Psychology Department Seminar, Dept. of Biochemistry Colloquium (2021)
2. Plenary Speaker at the ”International Symposium on Interdisciplinary Approaches in Health” hosted by the University of the Philippines
3. Case Western Reserve University (Colloquium, Spring 2020, Cancelled due to COVID19)
4. Colorado University Boulder (Dynamical Systems and Mathematical Biology Seminar, 2020)
5. Georgia State (Math Colloquium, Spring 2020)
6. Northwestern (Applied Math Colloquium, 2019)
7. Notre Dame (Applied Math Colloquium, 2019)
8. University of British Columbia (Mathematical Biology Seminar, 2019)
9. University of Melbourne (Biomedical Engineering Seminar, 2019)
10. University of Houston (Networks Seminar, 2018) - Modeling spatially organizing networks regulating cellular polarity and organization
11. MTSU (2017) - Modeling cell motility regulation
12. Queensland University of Technology (Applied Math seminar), (2015) Local Perturbation Analysis: A tool for analysing complex, pattern forming regulatory systems with applications to chemotactic polarization
13. Swinburne University (Applied Math seminar), (2015) Local Perturbation Analysis: A tool for analysing complex, pattern forming regulatory systems with applications to chemotactic polarization
14. University of Utah (Mathematical Biology Seminar), (2014) A unifying mechanism for spontaneous, stimulus induced, and dynamic cell polarity
15. North Carolina State (Applied Math Seminar), (2014) From cell polarity to embryogenesis
16. University of Kentucky (Colloquium), (2013) Topics in Mathematical Cell Biology: Cell polarity, embryogenesis, and central nervous system regeneration
17. Ohio State (Applied Mathematics Seminar), (2013) Asymptotic analysis of models of spontaneous, induced, and dynamic polarity establishment
18. University of California at Irvine (Applied Mathematics Seminar), (2012) Response thresholds and noise sensitivity in polarizing cells

19. University of Victoria (Mathematical Biology Seminar), (2012) Regulatory control of response thresholds during chemotactic polarization
20. University of Tennessee Knoxville and the National Institute for Mathematical and Biological Synthesis (NIMBioS) (NIMBioS short term visitor and Departmental Colloquium), (2011) A local analysis of symmetry breaking with applications to HeLa cell polarization: theory and experiment
21. John Innes Centre, Norwich UK, (2011) New methods for detecting symmetry breaking in cell polarization
22. University of British Columbia (PIMS Seminar), (2009) The role of the cochlear aspect ratio in hearing: simulation, asymptotics, and experiment
23. University of Auckland (Applied Mathematics Seminar), (2009) Modelling the hydro-elastic properties of the cochlea
24. Job Talks at various times: University of Michigan (Biophysics), Vanderbilt University (Physics and Astronomy), University of Pittsburg (Biomedical Engineering), Carnegie Mellon (Computer Science), UC Santa Cruz (Applied Mathematics), UC Irvine (Physics), University of Minnesota (Cell and Developmental Biology)

Other Oral Presentations

1. BIRS Conference on Mathematics of the Cell (2021) - I also organized this conference.
2. SIAM Life Sciences MS (Summer 2021, online)
3. Society of Mathematical Biology MS (Summer 2020, Canceled due to COVID19)
4. APS March Meeting (2020, Cancelled due to COVID19)
5. BIRS Conference on Bridging Cellular and Tissue Dynamics from Normal Development to Cancer: Mathematical, Computational, and Experimental Approaches, (2019)
6. Society for Mathematical Psychology Annual Meeting, (2019)
7. QBio Conference, (2019)
8. SIAM Life Sciences Conference, (2019)
9. BIRS Conference on Mathematical of the Cell, (2018) Modeling cytoskeletal regulation of insulin availability in Beta cells
10. AIMS Dynamical Systems, (2018) Crosstalk between Rac and Rho GTPases promote morphological heterogeneity among motile cells
11. SIAM Life Sciences, (2018) Mathematical modeling of rapid decisions involving changes of information
12. Gordon Conference on Motile and Contractile Systems, (2017) Feedbacks between ECM signaling, GTPase signaling, and cytoskeletal remodeling promote morphological heterogeneity among motile cells
13. Society for Mathematical Psychology Annual Meeting, (2017) Evidence accumulation versus urgency gating: what?s the distinction?
14. Japan-UCI 3D Morphogenesis Meeting, (2017) Stochastic dynamics and organization in early mammalian blastocyst
15. Gordon Conference on Cell Migration, (2017) Crosstalk between Rac, Rho and ECM signaling promotes heterogeneity among motile cells
16. SIAM Life Sciences Conference, (2016) A minimal GTPase circuit regulating cell shape and motility phenotype

17. QBio Conference, (2016) Stochasticity improves robustness of early embryonic development
18. Annual Summer Interdisciplinary Conference (ASIC), (2016) A new framework for modeling decisions about changing information
19. Aspen Center for Physics, (2016) Stochasticity dynamics and organization in the developing mammalian blastocyst
20. Society for Mathematical Biology conference, (2015) The genesis of actin waves and dynamic transitions in motile cells
21. Australia New Zealand Industrial and Applied Mathematics meeting, (2015) Asymmetries in the distribution of gene expression noise direct spatial organization in the developing mammalian embryo
22. Australasian Mathematical Psychology Society Meeting, (2015) Dynamic decision making: integration and adapting to new informational
23. Australian Mathematical Society Annual Meeting, (2014) Static to dynamic wave transitions in cells
24. Mathematics of the Cell: Integrating Genes, Biochemistry and Mechanics, (Banff - BIRS, 2014) Regulation of Dynamic Motility: Waves, Polarity, and Links to Cell Invasiveness
25. SIAM Conference on Nonlinear waves and coherent structures, (Cambridge, 2014) Actin Nucleation Waves in Motile Cells
26. SIAM Life Sciences, (Charlotte, 2014) Regulation of the First Embryonic Developmental Decision
27. Society for Mathematical Society Annual Meeting, (Quebec City, 2014) Accumulator models of decision-making under changing information
28. Mathematics at the Frontier of Developmental Biology, (PIMS Workshop, Vancouver 2014) Spatio-temporal Regulation of Early Blastocyst Development
29. University of California Irvine, Biomedical Engineering Seminar (2014) Design principles and control in biological systems
30. Biophysical Society Annual Meeting, (San Francisco, 2014) Dynamics of central nervous system regeneration
31. Q-Bio Conference, (Santa Fe, 2013) Heterogeneity of spatial regulation mitigates tradeoffs between short and long time repair responses in the adult central nervous system
32. AMS Western Sectional Meeting, (University of Colorado Boulder, 2013) Spatio-temporal regulation of developmental processes
33. Center for Complex Biological Systems Retreat, (Los Angeles, 2013) Population and distribution of cell states defined by a gene regulatory network
34. SIAM Life Sciences Meeting, (2012) A multi-scale approach to spatially distributed regulatory networks
35. Society of Mathematical Biology Annual Meeting, (2012) Mechanisms for biochemical sensitivity control in spatially distributed cellular systems
36. University of Tennessee Knoxville (Undergraduate Colloquium), (2011) Foundations of spatio-temporal pattern formation with applications to cell biology and ecology
37. International Congress on Industrial and Applied Mathematics, (2011) A mathematical basis for cell polarization
38. SIAM Great Lakes Conference: Modelling and Numerical PDEs in Mathematical Biology, (2010) Cochlear dynamics: dispersion and the uncertainty principle
39. SIAM Meeting on Dynamical Systems, (2009) Mixed method computations in cochlear dynamics

40. University of British Columbia (PIMS Seminar), (2008) Cochlear dynamics
41. Coalition for National Science Funding Annual Meeting at the request of the Math Association of America (MAA), (Washington, 2005), Competition and invasion, a multispecies view
42. APS Annual Meeting, (2004) Monte Carlo vs molecular dynamics in 2D crystalline defect diffusion

Research Supervision

- Vanderbilt University
  - Postdoc
    - Cole Zmurchok (Aug 2018 - Present) - NSERC Fellow
      - Employed in the biotech industry.
      - Received faculty position at a R1 university, but turned down for personal reasons.
    - Nathan Evans (2017 - 2018)
      - Now a lecture (Asst. Prof. equivalent) at U. of Queensland (Australia)
  - Student Supervision
    - Matthew Murrow (2019 - Present) - Physics PhD
    - John Vastola (2017 - 2021, Graduated) - Physics PhD
      - A postdoc at Harvard as of summer 2021.
  - Rotation Student Supervision
    - Geena Ildefonso (2016) - QCB Rotation Student
    - Ian Setliff (2016) - QCB Rotation Student
  - Undergraduate Student Supervision
    - Linghui Feng (2018-2019, Mathematics, Economics, Computer Science)
    - Payton O'Daniels (2018-2019 Computer Science) - NSF REU student
    - Sophia Druffner (2016-2017, Applied Mathematics) - SYBURE student.
    - Jared Ohlund (2016, Computer Science) - NSF REU student
    - Megan Woodruff (2016-2017, Computer Engineering), NSF REU student
    - Aneesha Dasari (2016 - 2017, Undecided major)
  - PhD ommittee member
    - Rebecca Creed (2021 - Present) - Mechanical Engineering
    - Nathanial Tenpas (2021 - Present) - Mathematics
    - Dora Obodo (2020 - Present) - Chemical and Physical Biology
    - Jason Hughes (2020 - Present) - Molecular Physiology and Biophysics
    - Kyle Hawkins (2019 - Present) - Physics
    - Samantha Beik (2019 - Present) - Chemical and Physical Biology
    - Brooks Musangu (2019 - Present) - Physics
    - Sylvia Morrow (2017 - 2020) - Physics
    - Matthew Feldman (2017 - 2021) - Physics
    - Aaron Stephens (2017 - 2020) - Physics
    - Corey Hayford (2016 - 2017) - Chemical and Physical Biology
    - Oscar Ortega (2016 - 2020) - Chemical and Physical Biology
    - Erin Shockley (2016 - 2019) - Chemical and Physical Biology
    - Weizhuang Peng (2016 - 2020) - Physics
- University of Melbourne
  - Phillip Brown (2015-2016) - Masters student. Since moved into PhD.

Teaching Experience

- 2021, Special Topics: Physics of Machine learning and Machine Learning for Physics (Phys 8001, Vanderbilt, 12 students)
- 2019, Mathematical Methods in Physics (Phys 4005/8005, Vanderbilt, 10 students)
- 2017, 2018, 2020: Physics of Living Systems (Phys 3122/8122, Vanderbilt, Spring 2017, 2018, 2020, 6-10 students)
- 2015-2018, 2020, 2021: Introductory Physics for Life Sciences (Phys 1501, Vanderbilt, Fall 2015-2018, 70 Students / course)
- 2015: Advanced Mathematical Modeling: Case Studies (MAST 90080, Winter 2015 in Australia, 20 Students)
- 2015: Calculus 2 (MAST 10006, University of Melbourne, 2015, 300 students)
- 2012: Infinite Series and Basic Linear Algebra (Math 2J, UC Irvine, Fall 2012, 100 Students)
- 2012: PIMS Mathematical Cell Biology Graduate Summer Course, Invited lecturer (University of British Columbia (UBC), 2012, 5 lectures - 2 hours each)
- 2010-2011: Integral Calculus with Applications to Life Sciences (UBC, Math 103, 110 students, 2010 and 2011)
- 2008: Mathematics Subject Graduate Record Examination (GRE) Prep Course (Indiana University (IUB), 10 students)
- 2008: Advanced calculus refresher for incoming graduate students (IUB, 20 students, summer short course)
- 2006:Introduction to Algebra (J010, IUB, 30 students, Groups Program Course for first generation college students from underprivileged backgrounds)
- 2005-2006: Algebra / Pre-Calculus (M025, IUB, 30 students, twice)

Service

- Departmental Service
  - Chair of the Communications Committee (2020-Present)
  - Member of the Colloquium Committee (2018-2020)
  - Member of the Physics and Astronomy graduate program committee (2015-2020).
  - Member of the Physics and Astronomy long range planning committee (2016-2018)
- University Service
  - Member of the Internal Advisory Committee for the U54 Center for Systems Biology of Small Cell Lung Cancer (2019 - Present)
  - Taught lecture in CPB 8328 (2019)
  - Member of the Graduate Faculty Delegate Assembly (2015 - 2018).
  - Member of the Quantitative and Chemical Biology / Interdisciplinary Graduate Program steering committee (2016-2019).
  - Panel member for: "Academic Job Search: Advice From Junior Faculty" (2016)
- Service to the academic community.
  - Lead organizing 2021 (October) Mathematics of the Cell Conference at the Banff International Research Station ($\sim$30 speakers from diverse fields of theoretical and experimental biology. Fully funded by the BIRS organization)

- Co-organized a session at SIAM Life Sciences in Summer 2020 (Cancelled due to COVID19)
- Co-editor of “Mathematical Modelling" special issue at Current Opinion in Systems Biology (published 2018)
- NSF panel member (2016, twice)
- Ad hoc grant reviewer for the Netherlands Organization for Scientific Research (NWO) (2016)
- Lecturer, Systems Biology Short Course (at UC Irvine, 2014)
- Co-supervised summer research experience for a local high school student (2013)
- Volunteer, MathCounts mathematics program for middle school students (2013)
- Volunteer, Euclid high school mathematics competition (Canada, 2012)
- Co-organizer Frontiers in Biophysics (2011) conference at UBC (participation throughout the pacific northwest). Funding secured through the Pacific Institute for the Mathematical Sciences (PIMS) and Mathematics of Information Technology and Complex Systems (MITACS).
- Reviewed for - Royal Society Interface, Physical Review E, Nature Communications, Proceedings of the Royal Society A, Wires Systems Biology and Medicine, BMC Systems Biology, Applied Mathematical Modelling, Biophysical Journal, Journal of Computational Physics, Discrete and Continuous Dynamical Systems B, PLoS Computational Biology, Molecular Biology of the Cell (MBoC), PLoS One, New Journal of Physics, Journal of Mathematical Biology, Nonlinearity, Journal of Theoretical Biology, Biomechanics and Modeling in Mechanobiology, SIAM Journal of Applied Mathematics, Behavioral Research Methods, Trends in Cognitive Sciences, Computational Brain and Behavior, Management Science, Journal of Cognitive Neuroscience, Computational and Structural Biotechnology, Mathematical Biosciences and Engineering, PNAS, ELife